

REMARKS

The Final Office Action mailed on April 15, 2003, has been received and reviewed.

Claims 1-4, 7-11, 14-16, and 20-32 remain pending and under consideration in the above-referenced application. Each of claims 1-4, 7-11, 14-16, and 20-32 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Information Disclosure Statements

Please note that Supplemental Information Disclosure Statements were filed in the above-referenced application on March 17, 2003, and April 7, 2003, but that the undersigned attorney has not yet received initialed copies of the Forms PTO-1449 that accompanied these Supplemental Information Disclosure Statements. It is respectfully requested that the references that are listed in the Supplemental Information Disclosure Statements be considered and made of record in the above-referenced application and that initialed copies of the accompanying Forms PTO-1449 evidencing such consideration be returned to the undersigned attorney.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1, 7, and 14 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, each of claims 1, 7, and 14 has been rejected for reciting the term “gradually.”

The third edition of the American Heritage College Dictionary defines the term “gradual” as “[a]dvancing or progressing by regular or continuous degrees.” In view of this definition, it is respectfully submitted that the term “gradually” is a relative term, which is acceptable if one of ordinary skill in the art would readily understand its meaning in light of the specification. *See* M.P.E.P. § 2173.05(b). The specification of the above-referenced application provides exemplary durations for each spinning speed set forth therein, which, when compared to the rotational speeds and nearly instantaneous changes in rotational speed that are described in the prior art (*see, e.g.*, U.S. Patent 6,117,486 to Yoshihara (hereinafter “Yoshihara”), provide one of skill in the art with clear guidance as to what is meant by the term “gradually,” as that term is used in claims 1, 7, and 14.

For example, one of ordinary skill in the art would readily recognize that, when a substrate is rotated at speeds that vary from about 0 rpm to about 4,500 rpm, as described in Yoshihara, acceleration or deceleration of the substrate at a rate of 10,000 rpm/s or greater, as described in Yoshihara, would not be gradual.

Accordingly, withdrawal of the 35 U.S.C. § 112, second paragraph, rejections of claims 1, 7, and 14 is respectfully requested.

Rejections Under 35 U.S.C. § 102(a)

Claims 1-4 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yoshihara.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, the identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Additionally, the elements must be arranged as required by the claim, but identity of the terminology is not required. *In re Bond*, 15 USPQ2d 1566 (Fed. Cir. 1990).

Yoshihara describes a resist coating method. Resist is applied to a substrate as the substrate is being rotated. The rate at which the substrate is rotated is then decreased for a predetermined period of time. Thereafter, the rate at which the substrate is rotated is again increased. Yoshihara teaches that by spinning a semiconductor wafer at high speeds, lowering the speed for a time, and re-increasing its rotational speed, the wafer can be coated with material in such a way that circular ripples do not appear thereon.

Yoshihara does not, however, expressly or inherently describe that re-increasing the rate of spinning of a substrate may be effected gradually. Rather, as indicated in the tables of columns 9 and 10 of Yoshihara, the acceleration and deceleration between different spinning speeds are affected very quickly—at least 10,000 rpm/s. It is respectfully submitted that one of ordinary skill in the art would readily recognize that, when a substrate is rotated at speeds that vary from about 0 rpm to about 4,500 rpm, a 10,000 rpm/s or greater acceleration or deceleration of the rotational speed of the substrate would not be gradual.

Accordingly, it is respectfully submitted that Yoshihara does not anticipate "gradually increasing a rate of . . . spinning," as recited in independent claim 1. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(b), independent claim 1 is allowable over Yoshihara.

Each of claims 1-3 is allowable, among other reasons, as depending from claim 1, which is allowable.

Claim 2 is further allowable since Yoshihara lacks any express or inherent description that recesses in the substrate are substantially filled as the substrate is spun at a first speed.

Claim 3 is additionally allowable since Yoshihara neither expressly nor inherently describes that, as a rate at which a substrate is spun is decreased to a second speed, material located within recesses of the substrate is permitted to set.

For these reasons, withdrawal of the 35 U.S.C. § 102(a) rejections of claims 1-4 is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-4, 7-11, 14-16, and 20-32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,405,813 to Rodrigues (hereinafter "Rodrigues").

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Rodrigues describes a method which includes spinning a semiconductor wafer at a first speed, decreasing a rate at which the wafer is spun to a second speed, applying photoresist to the substrate while the rate of spinning thereof is being decreased from the first speed to the second speed (col. 2, line 65, to col. 3, line 5; col. 5, lines 22-47), then increasing the rate at which the

wafer is spun to a third speed and further increasing the rate at which the wafer is spun to a fourth speed.

Rodrigues does not teach or suggest that material is located on the wafer as the wafer is spun at the first speed. Nor does Rodrigues teach or suggest maintaining the second rotational speed of the wafer once the material has been applied thereto and the second rotational speed has been reached.

Independent claim 1 is directed to a spin coating method which includes applying a material to a substrate, spinning the substrate and the material at a first speed, then decreasing a rate of spinning to a second speed, followed by gradually increasing a rate of spinning to a third speed.

Independent claim 7 recites a spin coating method which includes applying a material to a substrate, spinning the substrate and the material at a first speed that permits the material to flow into recesses formed in the substrate, then spinning the substrate at a second speed that permits material within the recesses to set, and, thereafter, gradually increasing a rate at which the substrate is spun to a third speed.

Independent claim 14 is drawn to a spin coating method that includes applying a material to a substrate, spinning the substrate at a first speed to at least partially spread the material, then spinning the substrate at a third speed to permit at least some of the material to flow into at least one recess formed in the substrate, and, thereafter, gradually increasing a rate of spinning of the substrate to a third speed.

It is respectfully submitted that Rodrigues does not support a *prima facie* case of obviousness against any of claims 1-4, 7-11, 14-16, or 20-32 because Rodrigues does not teach or suggest each and every element of any of claims 1-4, 7-11, 14-16, and 20-32.

Again, with respect to independent claim 1, the teachings of Rodrigues are limited to applying resist to a wafer as spinning of the wafer is decreased from a first speed to a second speed. Thus, in the method of Rodrigues, there is no resist on the wafer as it is spun at a first speed, as required by independent claim 1.

Even assuming, *arguendo*, that the second speed of Rodrigues corresponds to the first speed recited in independent claim 1, Rodrigues teaches that the third speed thereof, which would correspond to the second speed of independent claim 1, is greater than the second rotational speed thereof.

Thus, Rodrigues cannot teach or suggest both spinning a substrate a material thereon at a first speed and the sequence of spinning, decreasing, then increasing the rotational speed of the substrate that are recited in independent claim 1.

Claims 2-4 and 21-24 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claim 2, which recites that material may substantially fill recesses of a substrate as the substrate is spun at a first speed, is additionally allowable since Rodrigues neither teaches nor suggests that, as the wafer is being spun at the first or second speed thereof, resist may flow into recesses that are formed in the wafer. With respect to the first speed of Rodrigues, there is not yet any resist on the wafer with which recesses therein may be substantially filled. Col. 5, lines 22-27. As for the second speed of Rodrigues, at which resist has been applied to the wafer, Rodrigues lacks any teaching or suggest that the second speed is maintained for any period of time, let alone for a sufficient duration to permit resist to substantially fill recesses formed in the wafer.

Claim 3 is additionally allowable because Rodrigues lacks any teaching or suggestion that, as the rotational speed of a wafer is decreased from a first speed to a second speed, resist within recesses of the wafer may substantially set. Rather, in view of the facts that the teachings of Rodrigues are limited to applying resist to a wafer as the rotational speed thereof is decreased from a first speed to a second speed and that as soon as material has been applied to the wafer and the second speed is reached the rotational rate of the wafer is increased (col. 5, lines 44-47; col. 6, lines 13-17), the resist is not likely on the wafer for a sufficient period of time for the resist to set.

Claim 21 is further allowable since Rodrigues does not teach or suggest decreasing a rate of spinning of a substrate to a fourth speed after the rate of spinning of the substrate was increased to a third speed. Rather, the teachings of Rodrigues are limited to increasing the rate of

spinning of a wafer from a second speed to a third speed (col. 6, lines 13-17), then further increasing the rate at which the wafer is spun to a fourth speed (col. 6, lines 48-54).

Claim 23, which depends from claim 21, is also allowable because Rodrigues lacks any teaching or suggest that, following decreasing of the rotational speed of a substrate to a fourth speed, the rotational speed of the substrate may again be increased to a fifth speed.

With respect to independent claim 7, Rodrigues neither teaches nor suggests spinning a substrate and material thereon at a first speed that permits the material to flow into recesses formed in the substrate. Instead, Rodrigues teaches a method which includes applying resist to a wafer between a first speed and a second speed, after which rotation of the wafer is increased to a third speed.

Again assuming, for the sake of argument, that the second speed of Rodrigues corresponds to the first speed recited in independent claim 7, neither Rodrigues nor the knowledge that is generally available in the art provides any teaching or suggestion that increasing the rate of spinning to the third speed thereof, which corresponds to the second speed of independent claim 7, would permit material that has flowed into recesses of the wafer to set.

Accordingly, Rodrigues does not teach or suggest each and every element of independent claim 7.

Each of claims 8-11 and 25-28 is allowable, among other reasons, for depending either directly or indirectly from claim 7, which is allowable.

Claim 9 is further allowable because Rodrigues cannot teach or suggest both that material is applied to a substrate which is spun at a first speed and, thereafter, the rate at which the substrate spun is decreased. If it is the first speed of Rodrigues that corresponds to the first speed of independent claim 7, in the method of Rodrigues, resist has not yet been applied to the wafer (col. 5, lines 22-27), as required by independent claim 7. If, in the alternative, it is the second speed of Rodrigues that corresponds to the first speed of independent claim 7, Rodrigues teaches that the rotational speed of the wafer is *increased* to a third speed (col. 6, lines 13-17), not *gradually decreased* to a second speed, as required by claim 9.

Claim 10, which recites that material may substantially fill recesses of a substrate as the substrate is spun at a first speed, is additionally allowable since Rodrigues neither teaches nor

suggests that, as the wafer is being spun at the first or second speed thereof, resist may flow into recesses that are formed in the wafer. With respect to the first speed of Rodrigues, there is not yet any resist on the wafer with which recesses therein may be substantially filled. Col. 5, lines 22-27. As for the second speed of Rodrigues, at which resist has been applied to the wafer, Rodrigues lacks any teaching or suggest that the second speed is maintained for any period of time, let alone for a sufficient duration to permit resist to substantially fill recesses formed in the wafer.

Claim 25 is further allowable since Rodrigues does not teach or suggest decreasing a rate of spinning of a substrate to a fourth speed after the rate of spinning of the substrate was increased to a third speed. Rather, the teachings of Rodrigues are limited to increasing the rate of spinning of a wafer from a second speed to a third speed (col. 6, lines 13-17), then further increasing the rate at which the wafer is spun to a fourth speed (col. 6, lines 48-54).

Claim 27, which depends from claim 25, is also allowable because Rodrigues lacks any teaching or suggest that, following decreasing of the rotational speed of a substrate to a fourth speed, the rotational speed of the substrate may again be increased to a fifth speed.

As for independent claim 14, Rodrigues does not teach or suggest spinning a substrate and at a first speed to at least partially spread material thereon. Rather, the teachings of Rodrigues are limited to a method which includes applying resist to a wafer between a first speed and a second speed, after which rotation of the wafer is increased to a third speed.

Assuming again, *arguendo*, that the second speed of Rodrigues corresponds to the first speed recited in independent claim 14, neither Rodrigues nor the knowledge that is generally available in the art provides any teaching or suggestion that increasing the rate of spinning to the third speed thereof, which corresponds to the second speed of independent claim 14, would permit at least some material to flow into recesses formed in the wafer thereof.

Therefore, Rodrigues does not teach or suggest each and every element of independent claim 14.

Claims 15, 16, 20, and 29-32 are each allowable, among other reasons, as depending directly or indirectly from claim 14, which is allowable.

Claim 15, which recites that material may substantially fill recesses of a substrate as the substrate is spun at a first speed, is additionally allowable since Rodrigues neither teaches nor suggests that, as the wafer is being spun at the first or second speed thereof, resist may flow into recesses that are formed in the wafer. With respect to the first speed of Rodrigues, there is not yet any resist on the wafer with which recesses therein may be substantially filled. Col. 5, lines 22-27. As for the second speed of Rodrigues, at which resist has been applied to the wafer, Rodrigues lacks any teaching or suggest that the second speed is maintained for any period of time, let alone for a sufficient duration to permit resist to substantially fill recesses formed in the wafer.

Claim 16 is further allowable because Rodrigues cannot teach or suggest both that material is applied to a substrate which is spun at a first speed and, thereafter, the rate at which the substrate spun is decreased. If it is the first speed of Rodrigues that corresponds to the first speed of independent claim 14, in the method of Rodrigues, resist has not yet been applied to the wafer (col. 5, lines 22-27), as required by independent claim 14. If, in the alternative, it is the second speed of Rodrigues that corresponds to the first speed of independent claim 14, Rodrigues teaches that the rotational speed of the wafer is *increased* to a third speed (col. 6, lines 13-17), not *gradually decreased* to a second speed, as required by claim 16.

Claim 29 is further allowable since Rodrigues does not teach or suggest decreasing a rate of spinning of a substrate to a fourth speed after the rate of spinning of the substrate was increased to a third speed. Rather, the teachings of Rodrigues are limited to increasing the rate of spinning of a wafer from a second speed to a third speed (col. 6, lines 13-17), then further increasing the rate at which the wafer is spun to a fourth speed (col. 6, lines 48-54).

Claim 31, which depends from claim 29, is also allowable because Rodrigues lacks any teaching or suggest that, following decreasing of the rotational speed of a substrate to a fourth speed, the rotational speed of the substrate may again be increased to a fifth speed.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 1-4, 7-11, 14-16, and 20-32 be withdrawn.

CONCLUSION

It is respectfully submitted that each of claims 1-4, 7-11, 14-16, and 20-32 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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